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Intercalibration of Organochlorine Residues in Biota

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ABSTRACT

Phillips, G.A., and B.T. Hargrave. 1992. Intercalibration of organochlorine residues in biota. Can. Data Rep. Fish. Aquat. Sci. 879: iv + 65 p.

Biological samples were analyzed for 18 different organochlorine pesticides and PCBs by four separate laboratories. Results are presented in tabular form and a comparison by pairs of laboratories for seven major organochlorine compounds or groups of compounds is included.

RÉSUMÉ

Phillips, G.A., and B.T. Hargrave. 1992. Intercalibration of organochlorine residues in biota. Can. Data Rep. Fish. Aquat. Sci. 879: iv + 65 p.

Des échantillons biologiques sont analyzés pour 18 pesticides organochlorés différent par quatre laboratoires indépendent. Les resultats sont presentés sous forme de tableau et y compris une comparaison par des paires des laboratoires sept produits chemiques organochlorés à priorité ou des groupes des produits chemiques.

INTRODUCTION

This report summarizes the results of a comparison of organochlorine analyses carried out by different laboratories as part of an integrated Department of Fisheries and Oceans (DFO) study of LRTAP (Long-Range Transport of Airborne Pollutants) contaminants. The participating laboratories included Seakem Oceanography Limited (Sidney, B.C.), OceanChem Group (Dartmouth, N.S.), the Freshwater Institute (DFO Central and Arctic Region, Winnipeg, Man.), and the Marine Chemistry Division (DFO Scotia-Fundy Region, Physical and Chemical Sciences Branch, Bedford Institute of Oceanography [BIO], Dartmouth, N.S.).

The samples included zooplankton and benthic amphipod tissue, or extracts, from samples collected from the Canadian Ice Island in the Arctic Ocean (Hargrave et al. 1989) and St. Georges Bay, N.S. The extracts originated from whole tissue samples processed by Seakem Oceanography Limited in a previous (1987) contract for PCB and pesticide analysis of Arctic Ocean samples.

The following organochlorines were analyzed: PCBs (as Aroclor Equivalents 1254 and 1260), hexachlorobenzene (HCB), heptachlor, aldrin, *o,p'*-DDE, *p,p'*-DDE, mirex, α-, β-, and γ-hexachlorocyclohexane (HCH), oxychlordane, *trans*- and *cis*-chlordane, *o,p'*-DDT, *p,p'*-DDT, *o,p'*-DDD, *p,p'*-DDD, *cis*- and *trans*-nonachlor, heptachlor epoxide, alpha-endosulfan, dieldrin, endrin, methoxychlor, and toxaphene. Not all compounds were analyzed by all laboratories. Concentrations were reported on a wet weight and a lipid weight basis.

METHODS

Biological tissue samples were extracted using the method of Norstrom and Muir (1985). The whole tissue samples were ground, extracted with hexane, and cleaned up by gel permeation chromatography to remove lipids. The fractions were then separated on a Florisil column and analyzed by gas chromatography with electron capture detection. Gas chromatography/mass spectrometry was used for peak confirmation when necessary.

PCB concentrations were calculated as Aroclor 1254 or 1260 equivalents using eight to ten peaks common to the standard and a sample.

Toxaphene was quantitated by summing 19 peaks in Florisil Eluate Fractions 1 and 2 identified as toxaphene components by GC-MS, and multiplying these by a response factor based on the area of the 19 peaks in a toxaphene standard. The standard, provided by the Freshwater Institute, was used for calibration in all laboratories.

Where sample size was sufficient, lipids were analyzed gravimetrically by a modification of the Bligh and Dyer (1959) method. Samples of <0.1 g dry weight were analyzed using a microprocedure adapted from Barnes and Blackstock (1973).

DATA PRESENTATION

The data are tabulated and a summary sheet for each sample type is included with the mean and standard deviation for each compound analyzed by each laboratory. The notations "NA" and "ND" denote "not analyzed for" and "not detected," respectively. Any value preceded by "<" denotes a value less than the procedural detection limit for that compound, the detection limit

being defined as three standard deviations above the mean procedural blank. "Q" denotes that the compound was detected but the determined value was less than the quantitation limit. The quantitation limit was ten standard deviations above the mean procedural blank.

Only those samples with a fresh weight greater than 1 g were used for calculation of the mean and standard deviation. Also, only those samples analyzed by all laboratories were included in the calculation. If the data contained only one "ND," they were treated as zero and included in the mean. If there was more than one "ND," the value was reported as a range. "Q" values were treated as "ND"s unless they fell into the range of confirmed values.

An analysis of variance was performed for pairs of laboratories for some major individual organochlorines and groups of compounds (Table 1). A non-parametric statistical test (Kruskal-Wallis) was chosen because of the small sample size. In each case, a "p" value <0.05 indicates that there is a 95% probability that the two groups are different. Chlordane concentrations were calculated as the sum of the *cis*- and *trans*-isomers only. As Seakem Oceanography Limited did not analyze for *p,p'*-DDD in 1988, the DDT group includes only *p,p'*-DDT and *p,p'*-DDE for the extracts; but for zooplankton and amphipod whole tissue, *p,p'*-DDD is included. PCBs are Aroclor 1254 equivalents only.

DISCUSSION

The performance of different laboratories analyzing different sample types was compared (Table 1).

Because the Freshwater Institute analyzed all four sample types, this laboratory appears in the largest number of comparisons (seven of 11). Seakem Oceanography Limited and OceanChem Group each analyzed three of the four sample types and therefore provide six of 11 comparisons. Only zooplankton whole tissue was analyzed at the Marine Chemistry Division; thus, results for only a single sample type could be compared with those from the other three laboratories.

Seakem Oceanography Limited and the Freshwater Institute provided similar results for all six organochlorines determined using zooplankton whole tissue. These laboratories also provided similar results for zooplankton extracts for four of the six organochlorines. Chlordane and PCB levels were significantly different between the two laboratories. These two laboratories also had similar results, with the exception of chlordane and γ-HCH, for all organochlorines determined in amphipod extracts.

Absolute levels of PCBs in amphipod extracts were higher than those in zooplankton extracts (Appendices A and C) and thus are more accurately quantified. This may partly account for the similarity in values between the two laboratories for PCBs in amphipod extracts when significant difference between the laboratories occurred for zooplankton extracts.

Seakem Oceanography Limited and OceanChem Group each analyzed three tissue types, but they analyzed only two tissue types (zooplankton whole tissue and amphipod extracts) in common. OceanChem Group could quantify only PCBs in these samples. They could not determine levels of the other six organochlorines as they were either below their detection levels, or the presence of these compounds could not be verified by dual-column injections. PCB levels were significantly different in amphipod extracts with absolute

TABLE 1. p-values from one-way analysis of variance.

Compound	Zooplankton extracts	Zooplankton whole tissue							Amphipod extracts		Eurythenes whole tissue
	Seakem Oceanogr. and Freshwater Inst.	Seakem Oceanogr. and Freshwater Inst.	Seakem Oceanogr. and OceanChem Group	Seakem Oceanogr. and Marine Chemistry	Freshwater Inst. and OceanChem Group	Freshwater Inst. and Marine Chemistry	OceanChem Group and Marine Chemistry	Seakem Oceanogr. and Freshwater Inst.	Seakem Oceanogr. and OceanChem Group	Freshwater Inst. and OceanChem Group	Freshwater Inst. and OceanChem Group
α-HCH	0.25	0.05	*	0.38	*	0.05	*	0.12	*	*	*
γ-HCH	0.17	0.05	*	0.51	*	0.04	*	0.03	*	*	*
HCB	0.60	0.50	*	0.51	*	0.05	*	0.08	*	*	0.06
Chlor	0.02	0.51	*	-	*	-	-	0.02	*	*	0.12
DDTs	0.05	0.12	*	0.27	*	0.28	*	0.08	*	*	0.79
PCBs	0.01	0.05	0.51	0.05	0.51	0.83	0.51	0.08	0.01	0.01	0.79
Toxaphenes	-	-	-	-	*	*	*	-	-	0.01	0.04

"*" denotes that concentrations measured by one or both laboratories were below detection limits.
"-" denotes that the compound was not analyzed for by one or both laboratories.

concentrations determined by OceanChem Group lower by about 20x than those determined by Seakem Oceanography Limited (Appendix C). Also, although the p-value in Table 1 for PCB levels determined by these two laboratories in zooplankton whole tissue indicates similarity, absolute concentrations show this particular case to be misleading. OceanChem Group's wide-ranging values encompass but are not really similar to those of Seakem Oceanography Limited (Appendix B1-3).

The Freshwater Institute and OceanChem Group analyzed three tissue types in common; but, as described above, OceanChem Group was unable to quantify any of the organochlorines except PCBs in zooplankton whole tissue and amphipod extracts. Also, as in the comparison with Seakem Oceanography Limited for these sample types, levels of PCBs determined for amphipod extracts were different; and those for zooplankton whole tissue, while the p-value suggests similarity, were actually different.

The ability of OceanChem Group to measure organochlorines other than PCBs was shown by their determinations of five of the seven organochlorines quantified in whole tissue from *Eurythenes*. Levels of toxaphenes were significantly different ($p<0.05$), but other organochlorines detected by both laboratories (HCB, chlordane, DDTs, and PCBs) were similar.

Although the Marine Chemistry Division analyzed organochlorines only in zooplankton whole tissues, comparisons were possible for five of seven organochlorines quantified by the Freshwater Institute and Seakem Oceanography Limited. As described above for OceanChem Group, the lack of quantitative data for any organochlorine other than PCBs limited the comparison to this one compound type. Of the 11 possible comparisons across compound types, concentrations determined by the Marine Chemistry Division were similar in nine cases to those determined in other laboratories. The exceptions were γ-HCH (Freshwater Institute and Marine Chemistry Division) and PCBs (OceanChem Group and Marine Chemistry Division because of the widespread Oceanchem Group values).

SUMMARY

As unequal numbers of sample types and organochlorines were analyzed by the four laboratories, no analysis of variance was possible to compare laboratory performance. However, an arithmetic score was calculated for the six possible pairs of laboratory comparisons based on the number of organochlorines analyzed in common. The number of significant similarities was determined as a percentage of total comparisons (Table 2).

The comparison shows that >67% of determinations of organochlorines by Seakem Oceanography Limited, the Freshwater Institute, and the Marine Chemistry Division laboratories were similar. Chlordane, γ-HCH, PCBs, and toxaphenes yielded different results.

On the other hand, the comparisons of OceanChem Group results with the other three laboratories showed that <20% of the results were similar. The poor performance of OceanChem Group relative to the other three laboratories was largely due to the many organochlorines that could not be quantified by OceanChem Group but which were measured by the other laboratories. OceanChem Group was able to determine five of seven possible organochlorine types in *Eurythenes* whole tissue, which showed that this laboratory was able to quantify organochlorine compounds that they were unable to measure in other sample types. Absolute levels of organochlorines in *Eurythenes* tissue were also the highest measured in any of the four sample types compared

TABLE 2. Laboratory rankings for all organochlorines compared.

Laboratory	Total comparisons	Similarities	Differences	% similar	Ranking
Seakem Oceanogr. and Freshwater Inst.	18	14	4	78	2
Seakem Oceanogr. and OceanChem Group	12	0	12	0	5
Freshwater Inst. and OceanChem Group	21	4	17	9	4
Seakem Oceanogr. and Marine Chemistry	5	5	0	100	1
OceanChem Group and Marine Chemistry	6	0	6	0	5
Freshwater Inst. and Marine Chemistry	6	4	2	67	3

(Appendix D), and as mentioned above this could account for the quantitative data this laboratory provided for this sample type.

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APPENDIX A. CHLORINATED ORGANICS IN ZOOPLANKTON EXTRACTS

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A(13-17) - Raw Data (ng/g lipid weight) 21

Key: Seakem = Seakem Oceanography Limited (Sidney, B.C.)
OceanChem = OceanChem Group (Dartmouth, N.S.)
Fresh. Inst. = Freshwater Institute (DFO Central and Arctic Region, Winnipeg, Man.)

CHLORINATED ORGANICS IN ZOOPLANKTON

ng/g wet wt.
(n=4)

Compound	Seakem 1988 (fresh sample) Mean	Std.Dev.	OceanChem 1989 (1988 extract) Mean	Std.Dev.	Fresh. Inst. 1989 (1988 extract) Mean	Std.Dev.
Hexachlorocyclohexanes						
alpha-HCH	1.88	0.88	ND		1.23	0.45
beta-HCH	0.11	0.07	ND		<0.10 - 0.10	
gamma-HCH	0.23	0.12	ND		0.16	0.07
Hexachlorobenzene	0.59	0.40	ND		0.50	0.48
Cyclodienes						
aldrin	<0.01 - 0.04		ND		NA	
cis chlordane	0.89	0.31	ND		0.50	0.11
trans chlordane	0.35	0.13	>0.00 - 0.62		0.22	0.04
dieldrin	0.60	0.17	ND		0.36	0.07
endrin	0.09 - <0.68		ND		NA	
alpha-endosulfan	0.01 - <0.10		ND		NA	
heptachlor	<0.19		ND		<0.10	0.00
heptachlor epoxide	0.06 - <0.30		ND		0.06 - <0.10	
methoxychlor	<0.01 - 1.40		ND		NA	
mirex	0.04	0.03	ND		NA	
cis nonachlor	0.40	0.11	ND		0.13	0.04
trans nonachlor	NA		NA		0.41	0.22
oxychlordane	0.19	0.04	ND		<0.10 - 0.11	
DDT's						
p,p'-DDT	1.30	0.89	ND		0.21	0.08
o,p'-DDT	NA		NA		<0.10 - 0.64	
p,p'-DDE	0.53	0.14	ND		0.49	0.21
o,p'-DDE	0.21	0.11	ND		NA	
p,p'-DDD	NA		ND		0.05 - <0.10	
o,p'-DDD	NA		ND		NA	
PCB'S						
Aroclor 1254	6.08	1.99	ND		2.08	1.40
PCC'S						
Toxaphene	NA		>0.00 - 0.31		2.63	0.52

'NA' means not analyzed for
'ND' means not detected

Sample 3-87-17
Arctic Ice Isl. Zooplankton 1000u
Fresh wt.(g)= 1.90
Lipid (% of wet wt.)= 8.22
% Water= 74.72

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	2.10	ND	1.58
beta-HCH	0.05	ND	<0.10
gamma-HCH	0.35	ND	0.22
Hexachlorobenzene	0.61	ND	0.31
Cyclodienes			
aldrin	<0.01	ND	NA
cis chlordane	0.87	ND	0.59
trans chlordane	0.28	ND	0.23
dieldrin	0.75	ND	0.42
endrin	<0.68	ND	NA
alpha-endosulfan	<0.10	ND	NA
heptachlor	<0.02	ND	<0.10
heptachlor epoxide	<0.30	ND	<0.10
methoxychlor	<0.05	ND	NA
mirex	Q 1.00	ND	NA
cis nonachlor	0.39	ND	0.18
trans nonachlor	NA	NA	0.75
oxychlordane	0.23	ND	<0.10
DDT's			
p,p'-DDT	Q 81.00	ND	0.26
o,p'-DDT	NA	NA	0.64
p,p'-DDE	0.54	ND	0.48
o,p'-DDE	0.13	ND	NA
p,p'-DDD	NA	ND	<0.10
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	4.40	ND	0.00
PCC'S			
Toxaphene	NA	ND	3.21

Sample 3-87-34
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 8.04
Lipid (% of wet wt.)= 4.78
% Water= 85.94

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	0.90	ND	0.63
beta-HCH	0.11	ND	0.10
gamma-HCH	0.11	ND	0.08
Hexachlorobenzene	0.07	ND	0.03
Cyclodienes			
aldrin	<0.01	ND	NA
cis chlordane	0.59	ND	0.36
trans chlordane	0.27	ND	0.16
dieldrin	0.51	ND	0.30
endrin	<0.16	ND	NA
alpha-endosulfan	<0.02	ND	NA
heptachlor	<0.01	ND	<0.10
heptachlor epoxide	<0.07	ND	0.07
methoxychlor	<0.01	ND	NA
mirex	0.06	ND	NA
cis nonachlor	0.33	ND	0.09
trans nonachlor	NA	NA	0.42
oxychlordane	0.13	ND	0.11
DDT's			
p,p'-DDT	1.30	ND	0.17
o,p'-DDT	NA	NA	0.15
p,p'-DDE	0.44	ND	0.20
o,p'-DDE	0.18	ND	NA
p,p'-DDD	NA	ND	0.05
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	9.00	ND	3.61
PCC'S			
Toxaphene	NA	ND	1.97

Sample 1-J-86019
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 1.95
Lipid (% of wet wt.)= 4.51
% Water= 87.19

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	3.20	ND	1.74
beta-HCH	0.22	ND	<0.10
gamma-HCH	Q 0.33	ND	0.23
Hexachlorobenzene	1.20	ND	1.30
Cyclodienes			
aldrin	Q 0.04	ND	NA
cis chlordane	1.40	ND	0.62
trans chlordane	0.58	ND	0.27
dieldrin	0.76	ND	0.44
endrin	0.15	ND	NA
alpha-endosulfan	0.03	ND	NA
heptachlor	<0.19	ND	<0.10
heptachlor epoxide	0.19	ND	<0.10
methoxychlor	1.40	ND	NA
mirex	0.07	ND	NA
cis nonachlor	0.58	ND	0.15
trans nonachlor	NA	NA	0.18
oxychlordane	0.23	ND	<0.10
DDT's			
p,p'-DDT	2.50	ND	0.31
o,p'-DDT	NA	NA	<0.10
p,p'-DDE	0.75	ND	0.78
o,p'-DDE	Q 0.40	ND	NA
p,p'-DDD	NA	ND	<0.10
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	6.80	ND	3.08
PCC'S			
Toxaphene	NA	ND	3.07

Sample 1-J-86060
Arctic Ice Isl. Zooplankton 500u
Fresh wt.(g)= 6.47
Lipid (% of wet wt.)= 4.00
% Water= 87.94

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	1.30	ND	0.96
beta-HCH	0.05	ND	<0.10
gamma-HCH	0.12	ND	0.10
Hexachlorobenzene	0.48	ND	0.35
Cyclodienes			
aldrin	Q 0.01	ND	NA
cis chlordane	0.69	ND	0.43
trans chlordane	0.27	0.62	0.22
dieldrin	0.37	ND	0.29
endrin	0.09	ND	NA
alpha-endosulfan	Q 0.01	ND	NA
heptachlor	<0.06	ND	<0.10
heptachlor epoxide	0.06	ND	0.06
methoxychlor	<0.05	ND	NA
mirex	0.03	ND	NA
cis nonachlor	0.31	ND	0.10
trans nonachlor	NA	NA	0.27
oxychlordane	0.16	ND	<0.10
DDT's			
p,p'-DDT	1.40	ND	0.09
o,p'-DDT	NA	NA	<0.10
p,p'-DDE	0.39	ND	0.49
o,p'-DDE	Q 0.12	ND	NA
p,p'-DDD	NA	ND	<0.10
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	4.10	ND	1.61
PCC'S			
Toxaphene	NA	0.31	2.27

Sample 2-V-1049
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 0.87
Lipid (% of wet wt.)= 3.86
% Water= 90.78

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	3.10	ND	1.98
beta-HCH	0.24	ND	<0.10
gamma-HCH	Q 0.74	ND	0.23
Hexachlorobenzene	Q 0.49	ND	0.55
Cyclodienes			
aldrin	<0.02	ND	NA
cis chlordane	0.80	ND	0.30
trans chlordane	0.29	ND	<0.10
dieldrin	0.51	ND	0.62
endrin	0.13	ND	NA
alpha-endosulfan	Q 0.07	ND	NA
heptachlor	<0.44	ND	<0.10
heptachlor epoxide	0.23	ND	<0.10
methoxychlor	<0.35	ND	NA
mirex	<0.02	ND	NA
cis nonachlor	0.33	ND	<0.10
trans nonachlor	NA	NA	<0.10
oxychlordane	0.16	ND	<0.10
DDT's			
p,p'-DDT	2.20	ND	<0.10
o,p'-DDT	NA	NA	<0.10
p,p'-DDE	Q 0.40	ND	<0.10
o,p'-DDE	<0.27	ND	NA
p,p'-DDD	NA	ND	<0.10
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	6.10	ND	0.00
PCC'S			
Toxaphene	NA	ND	3.29

Sample 3-87-09
Arctic Ice Isl.Zooplankton 125u
Fresh wt. of sample(g)= 1.33
Lipid (% of wet wt.)= 1.33
% Water= 88.75

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	2.20	ND	
beta-HCH	0.14	ND	
gamma-HCH	0.27	ND	
Hexachlorobenzene	0.46	ND	
Cyclodienes			
aldrin	<0.01	ND	
cis chlordane	0.67	ND	
trans chlordane	Q 0.39	ND	
dieldrin	0.61	ND	
endrin	<0.98	ND	
alpha-endosulfan	<0.14	ND	
heptachlor	Q 0.08	ND	
heptachlor epoxide	<0.42	ND	
methoxychlor	<0.07	ND	
mirex	Q 0.05	ND	
cis nonachlor	0.42	ND	
trans nonachlor	NA	NA	
oxychlordane	0.16	ND	
DDT's			
p,p'-DDT	Q 0.37	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	0.50	ND	
o,p'-DDE	0.25	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	6.10	94.74	
PCC'S			
Toxaphene	NA	ND	

Sample 3-87-26
Arctic Ice Isl. Zooplankton 2000+u
Fresh wt.(g)= 4.67
Lipid (% of wet wt.)= 2.73
% Water= 89.09

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	0.64	ND	
beta-HCH	0.02	ND	
gamma-HCH	0.09	ND	
Hexachlorobenzene	0.26	ND	
Cyclodienes			
aldrin	<0.01	ND	
cis chlordane	0.52	ND	
trans chlordane	0.22	ND	
dieldrin	0.27	ND	
endrin	<0.28	ND	
alpha-endosulfan	<0.04	ND	
heptachlor	<0.01	ND	
heptachlor epoxide	<0.12	ND	
methoxychlor	<0.02	ND	
mirex	0.04	ND	
cis nonachlor	0.39	ND	
trans nonachlor	NA	NA	
oxychlordane	0.13	ND	
DDT's			
p,p'-DDT	1.30	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	0.34	ND	
o,p'-DDE	0.08	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	2.90	ND	
PCC'S			
Toxaphene	NA	ND	

Sample 2-V-1034
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 3.06
Lipid (% of wet wt.)= 2.10
% Water= 89.81

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	1.90	1.31	
beta-HCH	0.12	ND	
gamma-HCH	Q 0.21	ND	
Hexachlorobenzene	0.81	ND	
Cyclodienes			
aldrin	<0.01	ND	
cis chlordane	0.30	ND	
trans chlordane	0.13	ND	
dieldrin	0.25	ND	
endrin	0.07	ND	
alpha-endosulfan	<0.01	ND	
heptachlor	<0.12	ND	
heptachlor epoxide	0.08	ND	
methoxychlor	<0.10	ND	
mirex	Q 0.02	ND	
cis nonachlor	0.18	ND	
trans nonachlor	NA	NA	
oxychlordane	0.07	ND	
DDT's			
p,p'-DDT	0.27	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	0.20	ND	
o,p'-DDE	<0.08	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	2.40	ND	
PCC'S			
Toxaphene	NA	ND	

Sample 1-J-86009
Arctic Ice Isl. Zooplankton 63u
Fresh wt.(g)= 1.10
Lipid (% of wet wt.)= 1.94
% Water= 88.19

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	2.30	ND	
beta-HCH	0.20	ND	
gamma-HCH	Q 0.58	ND	
Hexachlorobenzene	0.50	ND	
Cyclodienes			
aldrin	Q 0.06	ND	
cis chlordane	0.97	ND	
trans chlordane	0.43	ND	
dieldrin	0.87	ND	
endrin	Q 0.09	ND	
alpha-endosulfan	0.23	ND	
heptachlor	<0.35	ND	
heptachlor epoxide	0.32	ND	
methoxychlor	5.60	ND	
mirex	<0.02	ND	
cis nonachlor	0.55	ND	
trans nonachlor	NA	NA	
oxychlordane	0.49	ND	
DDT's			
p,p'-DDT	2.70	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	Q 0.32	ND	
o,p'-DDE	<0.21	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	4.70	ND	
PCC'S			
Toxaphene	NA	ND	

Sample 1-J-86070
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 0.49
Lipid (% of wet wt.)= 6.29
% Water= 83.91

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	2.19	ND	
beta-HCH	<0.09	ND	
gamma-HCH	<0.39	ND	
Hexachlorobenzene	1.10	ND	
Cyclodienes			
aldrin	Q 0.14	ND	
cis chlordane	1.10	ND	
trans chlordane	0.58	ND	
dieldrin	0.78	ND	
endrin	0.08	ND	
alpha-endosulfan	<0.04	ND	
heptachlor	<0.78	ND	
heptachlor epoxide	0.12	ND	
methoxychlor	<0.61	ND	
mirex	<0.04	ND	
cis nonachlor	0.59	ND	
trans nonachlor	NA	NA	
oxychlordane	0.30	ND	
DDT's			
p,p'-DDT	2.40	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	0.74	ND	
o,p'-DDE	<0.47	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	8.00	ND	
PCC'S			
Toxaphene	NA	ND	

Sample 1-J-86101
Arctic Ice Isl. Zooplankton 1000+u
Fresh wt.(g)= 4.82
Lipid (% of wet wt.)= 6.90
% Water= 87.92

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	0.70	ND	
beta-HCH	0.11	ND	
gamma-HCH	0.15	ND	
Hexachlorobenzene	0.36	ND	
Cyclodienes			
aldrin	Q 0.02	ND	
cis chlordane	0.52	ND	
trans chlordane	0.24	ND	
dieldrin	0.47	ND	
endrin	<0.01	ND	
alpha-endosulfan	<0.01	ND	
heptachlor	<0.08	ND	
heptachlor epoxide	0.11	ND	
methoxychlor	Q 0.20	ND	
mirex	0.03	ND	
cis nonachlor	0.36	ND	
trans nonachlor	NA	NA	
oxychlordane	0.11	ND	
DDT's			
p,p'-DDT	0.44	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	0.29	ND	
o,p'-DDE	Q 0.16	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	2.60	ND	
PCC'S			
Toxaphene	NA	ND	

CHLORINATED ORGANICS IN ZOOPLANKTON
ng/g lipid wt.
(n=4)

Compound	Seakem 1988 (fresh sample) Mean	Std.Dev.	OceanChem 1989 (1988 extract) Mean	Std.Dev.	Fresh. Inst. 1989 (1988 extract) Mean	Std.Dev.
Hexachlorocyclohexanes						
alpha-HCH	37.00	20.25	ND		23.75	9.38
beta-HCH	2.28	1.58	ND		>1.20 - 2.09	
gamma-HCH	2.45	1.57	ND		2.99	1.28
Hexachlorobenzene	12.23	9.84	ND		10.49	10.97
Cyclodienes						
aldrin	<0.01 - Q 0.08		ND		NA	
cis chlordane	18.00	7.81	ND		9.80	2.67
trans chlordane	7.28	3.54	>0.00 - 15.50		4.41	1.36
dieldrin	11.55	3.24	ND		7.10	1.71
endrin	2.40 - <8.30		ND		NA	
alpha-endosulfan	Q 0.26 - <1.20		ND		NA	
heptachlor	<4.30		ND		<1.20 - 2.50	
heptachlor epoxide	<0.15 - 4.10		ND		<1.20 - 1.50	
methoxychlor	<0.24 - 30.00		ND		NA	
mirex	0.94	0.60	ND		NA	
cis nonachlor	8.10	3.05	ND		2.48	0.54
trans nonachlor	NA		NA		7.16	2.04
oxychlordane	3.73	1.00	ND		<1.20 - 2.30	
DDT's						
p,p'-DDT	39.25	10.28	ND		3.96	1.75
o,p'-DDT	NA		NA		<2.22 - 7.79	
p,p'-DDE	10.68	3.85	ND		9.89	5.23
o,p'-DDE	1.60 - Q 8.80		ND		NA	
p,p'-DDD	NA		ND		1.05 - <2.50	
o,p'-DDD	NA		ND		NA	
PCB'S						
Aroclor 1254	123.50	51.25	ND		46.02	29.65
PCC'S						
Toxaphene	NA		>0.00 - 7.75		51.28	11.85

Sample 3-87-17
Arctic Ice Isl. Zooplankton 1000u
Fresh wt.(g)= 1.90
Lipid (% of wet wt.)= 8.22
% Water= 74.72

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	25.00	ND	19.22
beta-HCH	0.63	ND	<1.20
gamma-HCH	4.30	ND	2.68
Hexachlorobenzene	7.40	ND	3.77
Cyclodienes			
aldrin	<0.01	ND	NA
cis chlordane	11.00	ND	7.18
trans chlordane	3.40	ND	2.80
dieldrin	9.00	ND	5.11
endrin	<8.30	ND	NA
alpha-endosulfan	<1.20	ND	NA
heptachlor	<0.19	ND	<1.20
heptachlor epoxide	<3.70	ND	<1.20
methoxychlor	<0.58	ND	NA
mirex	Q 0.46	ND	NA
cis nonachlor	4.70	ND	2.19
trans nonachlor	NA	NA	9.12
oxychlordane	2.80	ND	<1.20
DDT's			
p,p'-DDT	Q 37.00	ND	3.16
o,p'-DDT	NA	NA	7.79
p,p'-DDE	6.60	ND	5.84
o,p'-DDE	1.60	ND	NA
p,p'-DDD	NA	ND	<1.20
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	54.00	ND	0.00
PCC'S			
Toxaphene	NA	ND	39.10

Sample 3-87-34
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 8.04
Lipid (% of wet wt.)= 4.78
% Water= 85.94

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	19.00	ND	13.18
beta-HCH	2.40	ND	2.09
gamma-HCH	2.40	ND	1.67
Hexachlorobenzene	1.50	ND	0.63
Cyclodienes			
aldrin	<0.01	ND	NA
cis chlordane	13.00	ND	7.53
trans chlordane	5.80	ND	3.35
dieldrin	11.00	ND	6.28
endrin	<3.50	ND	NA
alpha-endosulfan	<0.50	ND	NA
heptachlor	<0.08	ND	<2.09
heptachlor epoxide	<0.15	ND	1.46
methoxychlor	<0.24	ND	NA
mirex	1.30	ND	NA
cis nonachlor	6.90	ND	1.88
trans nonachlor	NA	NA	8.79
oxychlordane	2.80	ND	2.30
DDT's			
p,p'-DDT	28.00	ND	3.56
o,p'-DDT	NA	NA	3.14
p,p'-DDE	9.40	ND	4.18
o,p'-DDE	3.80	ND	NA
p,p'-DDD	NA	ND	1.05
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	190.00	ND	75.52
PCC'S			
Toxaphene	NA	ND	41.21

Sample 1-J-86019
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 1.95
Lipid (% of wet wt.)= 4.51
% Water= 87.19

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	71.00	ND	38.58
beta-HCH	4.80	ND	<2.22
gamma-HCH	Q 7.40	ND	5.10
Hexachlorobenzene	28.00	ND	28.82
Cyclodienes			
aldrin	Q 0.80	ND	NA
cis chlordane	31.00	ND	13.75
trans chlordane	13.00	ND	5.99
dieldrin	17.00	ND	9.76
endrin	3.40	ND	NA
alpha-endosulfan	0.97	ND	NA
heptachlor	<4.30	ND	<2.22
heptachlor epoxide	4.10	ND	<2.22
methoxychlor	30.00	ND	NA
mirex	1.60	ND	NA
cis nonachlor	13.00	ND	3.33
trans nonachlor	NA	NA	3.99
oxychlordane	5.20	ND	<2.22
DDT's			
p,p'-DDT	56.00	ND	6.87
o,p'-DDT	NA	NA	<2.22
p,p'-DDE	17.00	ND	17.29
o,p'-DDE	Q 8.80	ND	NA
p,p'-DDD	NA	ND	<2.22
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	150.00	ND	68.29
PCC'S			
Toxaphene	NA	ND	68.07

Sample 1-J-86060
Arctic Ice Isl. Zooplankton 500u
Fresh wt.(g)= 6.47
Lipid (% of wet wt.)= 4.00
% Water= 87.94

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	33.00	ND	24.00
beta-HCH	1.30	ND	<2.50
gamma-HCH	3.10	ND	2.50
Hexachlorobenzene	12.00	ND	8.75
Cyclodienes			
aldrin	Q 0.27	ND	NA
cis chlordane	17.00	ND	10.75
trans chlordane	6.90	15.50	5.50
dieldrin	9.20	ND	7.25
endrin	2.40	ND	NA
alpha-endosulfan	Q 0.26	ND	NA
heptachlor	<1.50	ND	<2.50
heptachlor epoxide	1.60	ND	1.50
methoxychlor	<1.20	ND	NA
mirex	0.86	ND	NA
cis nonachlor	7.80	ND	2.50
trans nonachlor	NA	NA	6.75
oxychlordane	4.10	ND	<2.50
DDT's			
p,p'-DDT	36.00	ND	2.25
o,p'-DDT	NA	NA	<2.50
p,p'-DDE	9.70	ND	12.25
o,p'-DDE	Q 3.00	ND	NA
p,p'-DDD	NA	ND	<2.50
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	100.00	ND	40.25
PCC'S			
Toxaphene	NA	7.75	56.75

Sample 2-V-1049
Arctic Ice Isl. Zooplankton 250u
Fresh wt.(g)= 0.87
Lipid (% of wet wt.)= 3.86
% Water= 90.78

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	80.00	ND	51.30
beta-HCH	6.30	ND	<2.59
gamma-HCH	Q 19.00	ND	5.96
Hexachlorobenzene	Q 13.00	ND	14.25
Cyclodienes			
aldrin	<0.62	ND	NA
cis chlordane	21.00	ND	7.77
trans chlordane	7.50	ND	<2.59
dieldrin	13.00	ND	16.06
endrin	3.40	ND	NA
alpha-endosulfan	Q 1.80	ND	NA
heptachlor	<11.00	ND	<2.59
heptachlor epoxide	5.90	ND	<2.59
methoxychlor	<9.10	ND	NA
mirex	<0.62	ND	NA
cis nonachlor	8.50	ND	<2.59
trans nonachlor	NA	NA	<2.59
oxychlordane	4.20	ND	<2.59
DDT's			
p,p'-DDT	56.00	ND	<2.59
o,p'-DDT	NA	NA	<2.59
p,p'-DDE	Q 11.00	ND	<2.59
o,p'-DDE	<6.90	ND	NA
p,p'-DDD	NA	ND	<2.59
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	160.00	ND	0.00
PCC'S			
Toxaphene	NA	ND	85.23

APPENDIX B. CHLORINATED ORGANICS IN ZOOPLANKTON WHOLE TISSUE

Data Summary - Means and Standard Deviation (ng/g wet weight) 28
B(1-5) - Raw Data (ng/g wet weight) 29
B6 - Means and Standard Deviation (ng/g lipid weight) 34
B(7-9) - Raw Data (ng/g lipid weight) 35

Key: Seakem = Seakem Oceanography Limited (Sidney, B.C.)
OceanChem = OceanChem Group (Dartmouth, N.S.)
Fresh. Inst. = Freshwater Institute (DFO Central and Arctic Region, Winnipeg, Man.)
BIO = Marine Chemistry Division (DFO Scotia-Fundy Region, Physical and Chemical Sciences Branch Branch, Bedford Institute of Oceanography, Dartmouth, N.S.)

CHLORINATED ORGANICS IN ZOOPLANKTON
ng/g wet wt.
(n=3)

Compound	Seakem 1989 (fresh sample) Mean	Std.Dev.	OceanChem 1989 (fresh sample) Mean	Std.Dev.	Fresh. Inst. 1989 (fresh sample) Mean	Std.Dev.	BIO 1989 (fresh sample) Mean	Std.Dev.
Hexachlorocyclohexanes								
alpha-HCH	0.42	0.05	ND		0.80	0.07	0.40	0.04
beta-HCH	0.12	0.07	14.33	14.97	0.22	0.02	0.05	0.03
gamma-HCH	0.05	0.03	ND		0.16	0.01	0.07	0.01
Hexachlorobenzene	>0.04 - 0.40		ND		0.27	0.02	0.20	0.01
Cyclodienes								
aldrin	<0.06		>0.00 - 6.00		NA		0.12	0.07
cis chlordane	0.26	0.03	ND		0.23	0.02	NA	
trans chlordane	0.10	0.03	ND		0.16	0.01	NA	
dieldrin	0.27	0.08	>0.00 - 9.00		0.42	0.05	NA	
endrin	<0.02 - 0.14		>0.00 - 4.00		NA		NA	
alpha-endosulfan	0.11	0.03	ND		NA		NA	
heptachlor	<0.13		>0.00 - 6.00		<0.01	0.00	0.00	0.00
heptachlor epoxide	0.11	0.02	>0.00 - 20.00		0.10	0.00	0.04	0.05
methoxychlor	<0.04		>0.00 - 534.00		NA		NA	
mirex	<0.19		>0.00 - 52.00		NA		NA	
cis nonachlor	0.06	0.00	>0.00 - 2.00		<0.01 - 0.03		NA	
trans nonachlor	<0.33		NA		0.18	0.02	NA	
oxychlordane	0.04	0.03	>0.00 - 1.00		0.06	0.02	NA	
DDT's								
p,p'-DDT	<0.06		ND		0.17	0.05	0.28	0.20
o,p'-DDT	NA		NA		0.07	0.02	0.22	0.06
p,p'-DDE	<0.12 - 0.46		ND		0.50	0.12	0.00 - 0.19	
o,p'-DDE	<0.15		ND		NA		NA	
p,p'-DDD	0.14	0.03	ND		0.15	0.04	0.19	0.05
o,p'-DDD	0.12	0.01	ND		NA		NA	
PCB'S								
Aroclor 1254	0.87	0.17	248.33	195.95	4.23	1.13	4.34	2.26
PCC'S								
Toxaphene	NA		>0.00 - 92.00		0.41	0.04	ND	

Sample SGB(21/06/88)#103
St. George's Bay Zooplankton 250u

Lipid (% of wet wt.)= 1.089
% Water= 89.68

Compound (ng/g wet wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	0.45	ND	0.90	0.40
beta-HCH	0.02	8.00	0.21	0.09
gamma-HCH	0.04	ND	0.17	0.08
Hexachlorobenzene	0.40	ND	0.29	0.20
Cyclodienes				
aldrin	<0.01	6.00	NA	0.08
cis chlordane	0.25	ND	0.23	NA
trans chlordane	0.09	ND	0.17	NA
dieldrin	0.24	ND	0.45	NA
endrin	<0.02	ND	NA	NA
alpha-endosulfan	0.07	ND	NA	NA
heptachlor	<0.03	6.00	<0.01	0.00
heptachlor epoxide	0.08	ND	0.10	0.00
methoxychlor	<0.04	ND	NA	NA
mirex	<0.03	ND	NA	NA
cis nonachlor	0.06	ND	0.03	NA
trans nonachlor	0.26	NA	0.20	NA
oxychlordane	0.05	ND	0.08	NA
DDT's				
p,p'-DDT	<0.05	ND	0.18	0.56
o,p'-DDT	NA	NA	0.09	0.29
p,p'-DDE	0.46	ND	0.67	0.19
o,p'-DDE	<0.03	ND	NA	NA
p,p'-DDD	0.19	ND	0.20	0.26
o,p'-DDD	0.13	ND	NA	NA
PCB'S				
Aroclor 1254	0.80	266.00	5.80	6.53
PCC'S				
Toxaphene	NA	92.00	0.38	ND

Sample SGB(07/07/88)#104
St. George's Bay Zooplankton 250u

Lipid (% of wet wt.)= 1.019
% Water= 89.88

Compound (ng/g wet wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	0.35	ND	0.74	0.34
beta-HCH	0.19	35.00	0.20	0.03
gamma-HCH	0.09	ND	0.14	0.05
Hexachlorobenzene	<0.05	ND	0.29	0.19
Cyclodienes				
aldrin	<0.06	ND	NA	0.05
cis chlordane	0.23	ND	0.20	NA
trans chlordane	0.07	ND	0.16	NA
dieldrin	0.20	ND	0.35	NA
endrin	<0.02	4.00	NA	NA
alpha-endosulfan	0.15	ND	NA	NA
heptachlor	<0.13	ND	<0.01	0.00
heptachlor epoxide	0.11	ND	0.10	0.01
methoxychlor	<0.03	534.00	NA	NA
mirex	<0.19	52.00	NA	NA
cis nonachlor	0.05	ND	<0.01	NA
trans nonachlor	<0.33	NA	0.17	NA
oxychlordane	<0.02	1.00	0.06	NA
DDT's				
p,p'-DDT	<0.06	ND	0.22	0.09
o,p'-DDT	NA	NA	0.06	0.15
p,p'-DDE	<0.16	ND	0.42	0.00
o,p'-DDE	<0.15	ND	NA	NA
p,p'-DDD	0.12	ND	0.12	0.14
o,p'-DDD	0.11	ND	NA	NA
PCB'S				
Aroclor 1254	1.10	ND	3.70	1.23
PCC'S				
Toxaphene	NA	ND	0.46	ND

Sample SGB(07/09/88)#107
St. George's Bay Zooplankton 250u

Lipid (% of wet wt.)= 1.222
% Water= 86.68

Compound (ng/g wet wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	0.47	ND	0.78	0.45
beta-HCH	0.14	ND	0.24	0.02
gamma-HCH	0.03	ND	0.17	0.08
Hexachlorobenzene	<0.04	ND	0.24	0.22
Cyclodienes				
aldrin	<0.06	ND	NA	0.22
cis chlordane	0.30	ND	0.25	NA
trans chlordane	0.15	ND	0.15	NA
dieldrin	0.38	9.00	0.46	NA
endrin	0.14	ND	NA	NA
alpha-endosulfan	0.10	ND	NA	NA
heptachlor	<0.10	ND	<0.01	0.00
heptachlor epoxide	0.13	20.00	0.10	0.12
methoxychlor	<0.04	ND	NA	NA
mirex	<0.14	ND	NA	NA
cis nonachlor	0.06	2.00	<0.01	NA
trans nonachlor	<0.15	NA	0.16	NA
oxychlordane	0.08	ND	0.04	NA
DDT's				
p,p'-DDT	<0.04	ND	0.10	0.19
o,p'-DDT	NA	NA	0.05	0.23
p,p'-DDE	<0.12	ND	0.41	0.00
o,p'-DDE	<0.11	ND	NA	NA
p,p'-DDD	0.12	ND	0.13	0.18
o,p'-DDD	0.11	ND	NA	NA
PCB'S				
Aroclor 1254	0.70	479.00	3.20	5.26
PCC'S				
Toxaphene	NA	ND	0.38	ND

Sample SGB(26/10/88)#110
St. George's Bay Zooplankton 250u

Lipid (% of wet wt.)= 1.336
% Water= 86.94

Compound (ng/g wet wt.)	Seakem 1989	OceanChem 1989	Fresh.Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH		ND		0.11
beta-HCH		4.00		0.05
gamma-HCH		ND		0.03
Hexachlorobenzene		ND		0.08
Cyclodienes				
aldrin		ND		0.02
cis chlordane		ND		NA
trans chlordane		ND		NA
dieldrin		ND		NA
endrin		ND		NA
alpha-endosulfan		ND		NA
heptachlor		ND		0.00
heptachlor epoxide		ND		0.01
methoxychlor		ND		NA
mirex		ND		NA
cis nonachlor		ND		NA
trans nonachlor		NA		NA
oxychlordane		ND		NA
DDT's				
p,p'-DDT		ND		0.00
o,p'-DDT		NA		0.00
p,p'-DDE		ND		0.00
o,p'-DDE		ND		NA
p,p'-DDD		ND		0.15
o,p'-DDD		ND		NA
PCB'S				
Aroclor 1254		ND		2.31
PCC'S				
Toxaphene		ND		ND

Sample SGB(25/07/88)#105
St. George's Bay Zooplankton 250u

Lipid (% of wet wt.)= 1.479
% Water= 85.66

Compound (ng/g wet wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	0.70			
beta-HCH	0.04			0.62
gamma-HCH	0.08			0.06
Hexachlorobenzene	0.64			0.09
				0.43
Cyclodienes				
aldrin	<0.01			
cis chlordane	0.38			0.00
trans chlordane	0.16			NA
dieldrin	0.36			NA
endrin	<0.02			NA
alpha-endosulfan	0.13			NA
heptachlor	<0.02			NA
heptachlor epoxide	0.12			0.00
methoxychlor	<0.04			0.03
mirex	<0.02			NA
cis nonachlor	0.09			NA
trans nonachlor	0.35			NA
oxychlordane	0.06			NA
				NA
DDTs				
p,p'-DDT	<0.05			
o,p'-DDT	NA			0.13
p,p'-DDE	0.32			0.17
o,p'-DDE	<0.02			0.00
p,p'-DDD	0.18			NA
o,p'-DDD	0.14			0.15
				NA
PCBs				
Aroclor 1254	1.10			
				2.11
PCCs				
Toxaphene	NA			
				ND

CHLORINATED ORGANICS IN ZOOPLANKTON
ng/g lipid wt.
n=3

	Seakem 1989 (fresh sample)		OceanChem 1989 (fresh sample)		Fresh. Inst. 1989 (fresh sample)		BIO 1989 (fresh sample)	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Hexachlorocyclohexanes								
alpha-HCH	38.04	2.86	ND		73.03	7.68	35.64	1.61
beta-HCH	10.65	6.89	1389.79	1476.77	19.52	0.17	4.28	2.86
gamma-HCH	4.98	2.77	ND		14.42	0.84	6.27	1.02
Hexachlorobenzene	<3.27 - 36.73		ND		24.91	3.80	18.34	0.27
Cyclodienes								
aldrin	<5.89		>0.00 - 550.96		NA		10.09	5.68
cis chlordane	23.36	0.86	ND		20.40	0.61	NA	
trans chlordane	9.13	2.29	ND		14.53	1.60	NA	
dieldrin	24.26	4.94	>0.00 - 736.00		37.77	2.85	NA	
endrin	<1.84 - 11.46		>0.00 - 392.54		NA		NA	
alpha-endosulfan	9.78	3.57	ND		NA		NA	
heptachlor	<12.76		>0.00 - 550.96		>0.98		0.00	0.00
heptachlor epoxide	9.59	1.59	>0.00 - 1636.66		9.06	0.67	3.60	4.42
methoxychlor	<3.67		>0.00 - 52404.32		NA		NA	
mirex	<2.75 - 11.46		>0.00 - 5103.04		NA		NA	
cis nonachlor	5.11	0.28	>0.00 - 163.67		>0.82 - 2.75		NA	
trans nonachlor	<12.27 - 23.88		NA		16.05	2.20	NA	
oxychlordane	<1.96 - 6.55		>0.00 - 98.14		5.50	1.69	NA	
DDT's								
p,p'-DDT	<5.89		ND		15.43	5.53	25.27	18.70
o,p'-DDT	NA		NA		6.08	1.71	20.06	4.94
p,p'-DDE	<9.82 - 42.24		ND		45.43	11.80	0.00 - 17.45	
o,p'-DDE	<14.72		ND		NA		NA	
p,p'-DDD	13.02	3.24	ND		13.60	3.41	17.45	4.56
o,p'-DDD	10.58	1.21	ND		NA		NA	
PCB'S								
Aroclor 1254	79.56	21.13	21208.04	16163.51	385.86	111.69	383.59	198.30
PCC'S								
Toxaphene	NA		>0.00 - 8448.12		37.04	5.93	ND	

Sample SGB(21/06/88)#103
St. George's Bay Zooplankton 250u
Fresh wt.(g)=
Lipid (% of wet wt.)= 1.089
% Water= 89.68

Compound (ng/g lipid wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	41.32	ND	82.64	36.73
beta-HCH	1.84	734.62	19.28	8.26
gamma-HCH	3.67	ND	15.61	7.35
Hexachlorobenzene	36.73	ND	26.63	18.37
Cyclodienes				
aldrin	<0.92	550.96	NA	7.35
cis chlordane	22.96	ND	21.12	NA
trans chlordane	8.26	ND	15.61	NA
dieldrin	22.04	ND	41.32	NA
endrin	<1.84	ND	NA	NA
alpha-endosulfan	6.43	ND	NA	NA
heptachlor	<2.75	550.96	<0.92	0.00
heptachlor epoxide	7.35	ND	9.18	0.00
methoxychlor	<3.67	ND	NA	NA
mirex	<2.75	ND	NA	NA
cis nonachlor	5.51	ND	2.75	NA
trans nonachlor	23.88	NA	18.37	NA
oxychlordane	4.59	ND	7.35	NA
DDT's				
p,p'-DDT	<4.59	ND	16.53	51.42
o,p'-DDT	NA	NA	8.26	26.63
p,p'-DDE	42.24	ND	61.52	17.45
o,p'-DDE	<2.75	ND	NA	NA
p,p'-DDD	17.45	ND	18.37	23.88
o,p'-DDD	11.94	ND	NA	NA
PCB'S				
Aroclor 1254	73.46	24426.08	532.60	599.63
PCC'S				
Toxaphene	NA	8448.12	34.89	ND

Sample SGB(07/07/88)#104
St. George's Bay Zooplankton 250u
Fresh wt.(g)=
Lipid (% of wet wt.)= 1.019
% Water= 89.88

Compound (ng/g lipid wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	34.35	ND	72.62	33.37
beta-HCH	18.65	3434.74	19.63	2.94
gamma-HCH	8.83	ND	13.74	4.91
Hexachlorobenzene	<4.91	ND	28.46	18.65
Cyclodienes				
aldrin	<5.89	ND	NA	4.91
cis chlordane	22.57	ND	19.63	NA
trans chlordane	6.87	ND	15.70	NA
dieldrin	19.63	ND	34.35	NA
endrin	<1.96	392.54	NA	NA
alpha-endosulfan	14.72	ND	NA	NA
heptachlor	<12.76	ND	<0.98	0.00
heptachlor epoxide	10.79	ND	9.81	0.98
methoxychlor	<2.94	52404.32	NA	NA
mirex	<18.65	5103.04	NA	NA
cis nonachlor	4.91	ND	<0.98	NA
trans nonachlor	<32.38	NA	16.68	NA
oxychlordane	<1.96	98.14	5.89	NA
DDT's				
p,p'-DDT	<5.89	ND	21.59	8.83
o,p'-DDT	NA	NA	5.89	14.72
p,p'-DDE	<15.70	ND	41.22	0.00
o,p'-DDE	<14.72	ND	NA	NA
p,p'-DDD	11.78	ND	11.78	13.74
o,p'-DDD	10.79	ND	NA	NA
PCB'S				
Aroclor 1254	107.95	ND	363.10	120.71
PCC'S				
Toxaphene	NA	ND	45.14	ND

Sample SGB(07/09/88)#107
St. George's Bay Zooplankton 250u
Fresh wt.(g)=
Lipid (% of wet wt.)= 1.222
% Water= 86.68

Compound (ng/g lipid wt.)	Seakem 1989	OceanChem 1989	Fresh. Inst. 1989	Mar.Chem.BIO/1989
Hexachlorocyclohexanes				
alpha-HCH	38.46	ND	63.83	36.82
beta-HCH	11.46	ND	19.64	1.64
gamma-HCH	2.45	ND	13.91	6.55
Hexachlorobenzene	<3.27	ND	19.64	18.00
Cyclodienes				
aldrin	<4.91	ND	NA	18.00
cis chlordane	24.55	ND	20.46	NA
trans chlordane	12.27	ND	12.27	NA
dieldrin	31.10	736.50	37.64	NA
endrin	11.46	ND	NA	NA
alpha-endosulfan	8.18	ND	NA	NA
heptachlor	<8.18	ND	<0.82	0.00
heptachlor epoxide	10.64	1636.66	8.18	9.82
methoxychlor	<3.27	ND	NA	NA
mirex	11.46	ND	NA	NA
cis nonachlor	4.91	163.67	<0.82	NA
trans nonachlor	<12.27	NA	13.09	NA
oxychlordane	6.55	ND	3.27	NA
DDT's				
p,p'-DDT	<3.27	ND	8.18	15.55
o,p'-DDT	NA	NA	4.09	18.82
p,p'-DDE	<9.82	ND	33.55	0.00
o,p'-DDE	<9.00	ND	NA	NA
p,p'-DDD	9.82	ND	10.64	14.73
o,p'-DDD	9.00	ND	NA	NA
PCB'S				
Aroclor 1254	57.28	39198.04	261.87	430.44
PCC'S				
Toxaphene	NA	ND	31.10	ND

APPENDIX C. CHLORINATED ORGANICS IN AMPHIPOD EXTRACTS

Data Summary - Means and Standard Deviation (ng/g wet weight) 40
C(1-9) - Raw Data (ng/g wet weight) 41
C10 - Means and Standard Deviation (ng/g lipid weight) 50
C(11-15) - Raw Data (ng/g lipid weight) 51

Key: Seakem = Seakem Oceanography Limited (Sidney, B.C.)
OceanChem = OceanChem Group (Dartmouth, N.S.)
Fresh. Inst. = Freshwater Institute (DFO Central and Arctic Region, Winnipeg, Man.)

CHLORINATED ORGANICS IN BENTHIC AMPHIPODS

ng/g wet wt.
(n=5)

Compound	Seakem 1988 (fresh sample) Mean	Std.Dev.	OceanChem 1989 (1988 extract) Mean	Std.Dev.	Fresh. Inst. 1989 (1988 extract) Mean	Std.Dev.
Hexachlorocyclohexanes						
alpha-HCH	8.32	3.09	>0.00 - 12.36		4.48	2.52
beta-HCH	0.17	0.10	ND		<0.10	0.00
gamma-HCH	2.30	3.01	ND		0.38	0.18
Hexachlorobenzene	7.22	1.55	>0.00 - 12.50		5.36	2.24
Cyclodienes						
aldrin	<0.01 - 0.96		1.46	0.99	NA	
cis chlordane	18.00	4.73	ND		8.31	2.83
trans chlordane	4.58	1.55	>0.00 - 3.90		1.78	0.57
dieldrin	4.27	1.62	>0.00 - 2.02		3.16	1.36
endrin	0.54	0.50	ND		NA	
alpha-endosulfan	Q 0.03 - 0.18		ND		NA	
heptachlor	<0.01 - 0.19		>0.00 - 3.23		<0.10 - 0.13	
heptachlor epoxide	1.91	1.10	ND		0.88	0.58
methoxychlor	2.33	2.16	ND		NA	
mirex	3.22	1.36	ND		NA	
cis nonachlor	16.78	5.26	>0.00 - 1.95		7.36	2.24
trans nonachlor	NA		NA		26.96	6.62
oxychlordane	14.38	8.36	>0.00 - 2.18		7.70	3.36
DDT's						
p,p'-DDT	35.00	20.71	ND		9.60	5.69
o,p'-DDT	NA		NA		1.06	0.53
p,p'-DDE	77.8	35.67	62.96	54.63	58.81	31.22
o,p'-DDE	0.38	0.17	>0.00 - 42.58		NA	
p,p'-DDD	NA		>0.00 - 35.12		5.52	0.37
o,p'-DDD	NA		ND		NA	
PCB'S						
Aroclor 1254	434.00	167.16	22.30	10.12	228.50	123.26
PCC'S						
Toxaphene	NA		1.95	0.39	73.15	22.86

Sample 3-87-38
Arctic Ice Isl. Benthic Amphipod - Imetonux
Fresh wt.(g)= 3.57
Lipid (% of wet wt.)= 5.02
% Water= 75.92

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	7.40	ND	2.57
beta-HCH	0.04	ND	<0.10
gamma-HCH	0.59	ND	0.26
Hexachlorobenzene	6.30	ND	5.56
Cyclodienes			
aldrin	0.96	2.24	NA
cis chlordane	23.00	ND	6.87
trans chlordane	7.20	ND	1.66
dieldrin	6.73	ND	4.76
endrin	1.40	ND	NA
alpha-endosulfan	Q 0.18	ND	NA
heptachlor	0.19	ND	0.13
heptachlor epoxide	2.90	ND	1.83
methoxychlor	Q 0.08	ND	NA
mirex	5.30	ND	NA
cis nonachlor	24.00	ND	7.09
trans nonachlor	NA	NA	32.58
oxychlordane	29.00	ND	11.05
DDT's			
p,p'-DDT	43.00	ND	7.47
o,p'-DDT	NA	NA	0.67
p,p'-DDE	130.00	158.54	111.15
o,p'-DDE	0.69	42.58	NA
p,p'-DDD	NA	ND	5.90
o,p'-DDD	NA	ND	NA
PCB's			
Aroclor 1254	720.00	39.78	417.20
PCC's			
Toxaphene	NA	2.24	68.93

Sample 3-87-52
Arctic Ice Isl. Benthic Amphipod - Imetonyx
Fresh wt.(g)= 3.20
Lipid (% of wet wt.)= 6.64
% Water= 74.08

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	8.00	ND	4.11
beta-HCH	0.17	ND	<0.10
gamma-HCH	0.61	ND	0.48
Hexachlorobenzene	10.00	12.50	9.53
Cyclodienes			
aldrin	<0.01	1.25	NA
cis chlordane	19.00	ND	8.71
trans chlordane	4.70	ND	1.75
dieldrin	5.40	ND	3.52
endrin	<0.41	ND	NA
alpha-endosulfan	<0.06	ND	NA
heptachlor	<0.01	ND	<0.10
heptachlor epoxide	1.80	ND	1.01
methoxychlor	1.60	ND	NA
mirex	4.40	ND	NA
cis nonachlor	19.00	ND	8.35
trans nonachlor	NA	NA	34.51
oxychlordane	11.00	ND	6.41
DDT's			
p,p'-DDT	39.00	ND	9.52
o,p'-DDT	NA	NA	1.85
p,p'-DDE	85.00	75.63	70.09
o,p'-DDE	0.38	26.88	NA
p,p'-DDD	NA	ND	5.81
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	490.00	26.88	329.75
PCC'S			
Toxaphene	NA	2.5	95.63

Sample 1-V-8600103
Arctic Ice Isl. Benthic Amphipod - Anonyx nugax
Fresh wt.(g)= 2.05
Lipid (% of wet wt.)= 2.34
% Water= 80.09

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	3.20	1.95	1.72
beta-HCH	0.25	ND	<0.10
gamma-HCH	0.78	ND	0.23
Hexachlorobenzene	6.30	ND	4.17
Cyclodienes			
aldrin	<0.01	0.98	NA
cis chlordane	23.00	ND	13.29
trans chlordane	4.60	3.90	2.59
dieldrin	2.10	ND	1.24
endrin	0.10	ND	NA
alpha-endosulfan	Q 0.03	ND	NA
heptachlor	<0.19	ND	<0.10
heptachlor epoxide	0.26	ND	0.07
methoxychlor	0.48	ND	NA
mirex	2.10	ND	NA
cis nonachlor	19.00	1.95	10.60
trans nonachlor	NA	NA	27.61
oxychlordane	6.30	ND	3.26
DDT's			
p,p'-DDT	27.00	ND	6.44
o,p'-DDT	NA	NA	1.29
p,p'-DDE	40.00	22.44	29.39
o,p'-DDE	Q 0.38	ND	NA
p,p'-DDD	NA	35.12	5.05
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	250.00	11.71	106.63
PCC'S			
Toxaphene	NA	1.95	92.70

Sample 2-J-1011
Arctic Ice Isl. Benthic Amphipod - Anonyx nugax
Fresh wt.(g)= 4.95
Lipid (% of wet wt.)= 6.13
% Water= 79.00

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	12.00	ND	8.97
beta-HCH	0.08	ND	<0.10
gamma-HCH	1.20	ND	0.69
Hexachlorobenzene	7.80	ND	4.51
Cyclodienes			
aldrin	Q 0.01	2.83	NA
cis chlordane	13.00	ND	7.98
trans chlordane	4.00	ND	2.04
dieldrin	3.80	2.02	4.34
endrin	0.46	ND	NA
alpha-endosulfan	0.03	ND	NA
heptachlor	<0.08	3.23	<0.10
heptachlor epoxide	1.30	ND	0.59
methoxychlor	3.60	ND	NA
mirex	2.30	ND	NA
cis nonachlor	13.00	ND	7.06
trans nonachlor	NA	NA	24.22
oxychlordane	7.60	ND	5.65
DDT's			
p,p'-DDT	67.00	ND	20.44
o,p'-DDT	NA	NA	1.16
p,p'-DDE	36.00	ND	25.04
o,p'-DDE	0.19	ND	NA
p,p'-DDD	NA	ND	5.75
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	290.00	18.59	120.77
PCC'S			
Toxaphene	NA	1.62	76.50

Sample 2-V-1038
Arctic Ice Isl. Benthic Amphipod - Onisimus
Fresh wt.(g)= 2.75
Lipid (% of wet wt.)= 4.65
% Water= 70.19

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	11.00	12.36	5.02
beta-HCH	0.32	ND	<0.10
gamma-HCH	8.30	ND	0.26
Hexachlorobenzene	5.70	ND	3.03
Cyclodienes			
aldrin	Q 0.03	ND	NA
cis chlordane	12.00	ND	4.70
trans chlordane	2.40	1.45	0.84
dieldrin	3.30	ND	1.93
endrin	0.73	ND	NA
alpha-endosulfan	0.05	ND	NA
heptachlor	<0.14	ND	<0.10
heptachlor epoxide	3.30	ND	0.92
methoxychlor	5.90	ND	NA
mirex	2.00	ND	NA
cis nonachlor	8.90	0.73	3.69
trans nonachlor	NA	NA	15.88
oxychlordane	18.00	2.18	12.12
DDT's			
p,p'-DDT	19.00	ND	4.12
o,p'-DDT	NA	NA	0.31
p,p'-DDE	98.00	58.18	58.39
o,p'-DDE	Q 0.28	ND	NA
p,p'-DDD	NA	ND	5.11
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	420.00	14.55	168.15
PCC'S			
Toxaphene	NA	1.45	31.97

Sample 3-87-36
Arctic Ice Isl. Benthic Amphipod - Psammonyx
Fresh wt.(g)= 2.80
Lipid (% of wet wt.)= 4.93
% Water= 80.06

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	3.90	ND	
beta-HCH	0.15	ND	
gamma-HCH	0.40	ND	
Hexachlorobenzene	2.90	ND	
Cyclodienes			
aldrin	<0.01	0.71	
cis chlordane	6.60	ND	
trans chlordane	1.20	ND	
dieldrin	1.50	ND	
endrin	<0.46	ND	
alpha-endosulfan	<0.07	ND	
heptachlor	<0.01	ND	
heptachlor epoxide	Q 0.67	ND	
methoxychlor	Q 0.10	ND	
mirex	1.40	ND	
cis nonachlor	7.50	ND	
trans nonachlor	NA	NA	
oxychlordane	4.40	ND	
DDT's			
p,p'-DDT	16.00	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	29.00	30.00	
o,p'-DDE	0.43	10.00	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	210.00	10.71	
PCC'S			
Toxaphene	NA	2.86	

Sample 3-87-40
Arctic Ice Isl. Benthic Amphipods - juveniles
Fresh wt.(g)= 3.27
Lipid (% of wet wt.)= 8.37
% Water= 76.16

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	6.90	ND	
beta-HCH	0.22	ND	
gamma-HCH	0.65	ND	
Hexachlorobenzene	4.50	ND	
Cyclodienes			
aldrin	<0.01	ND	
cis chlordane	7.80	ND	
trans chlordane	1.40	ND	
dieldrin	1.40	ND	
endrin	<0.40	ND	
alpha-endosulfan	<0.06	ND	
heptachlor	<0.01	ND	
heptachlor epoxide	0.84	ND	
methoxychlor	<0.03	ND	
mirex	1.50	ND	
cis nonachlor	8.50	ND	
trans nonachlor	NA	NA	
oxychlordane	6.40	ND	
DDT's			
p,p'-DDT	17.00	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	36.00	ND	
o,p'-DDE	0.33	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	170.00	10.40	
PCC'S			
Toxaphene	NA	1.83	

Sample 1-V-8600105
Arctic Ice Isl. Benthic Amphipod - Anonyx nugax
Fresh wt.(g)= 1.02
Lipid (% of wet wt.)= 10.67
% Water= 69.63

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	3.30	ND	
beta-HCH	Q 0.15	ND	
gamma-HCH	0.67	ND	
Hexachlorobenzene	6.30	ND	
Cyclodienes			
aldrin	0.12	ND	
cis chlordane	14.00	ND	
trans chlordane	4.20	3.92	
dieldrin	6.10	ND	
endrin	0.24	ND	
alpha-endosulfan	0.07	ND	
heptachlor	Q 1.20	ND	
heptachlor epoxide	1.20	ND	
methoxychlor	<0.29	ND	
mirex	1.40	ND	
cis nonachlor	12.00	ND	
trans nonachlor	NA	NA	
oxychlordane	5.20	ND	
DDT's			
p,p'-DDT	39.00	ND	
o,p'-DDT	NA	NA	
p,p'-DDE	70.00	39.22	
o,p'-DDE	Q 0.76	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	240.00	11.76	
PCC'S			
Toxaphene	NA	1.96	

Sample 1-V-8600109
Arctic Ice Isl. Benthic Amphipod - *Anonyx nugax*
Fresh wt.(g)= 1.61
Lipid (% of wet wt.)= 1.10
% Water= 77.14

Compound (ng/g wet wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	6.40	ND	
beta-HCH	Q 0.09	ND	
gamma-HCH	0.45	ND	
Hexachlorobenzene	5.50	ND	
Cyclodienes			
aldrin	<0.01	ND	
cis chlordane	12.00	ND	
trans chlordane	3.20	ND	
dieldrin	1.20	ND	
endrin	0.08	ND	
alpha-endosulfan	0.01	ND	
heptachlor	<0.24	ND	
heptachlor epoxide	0.13	ND	
methoxychlor	<0.19	ND	
mirex	2.30	ND	
cis nonachlor	13.00	ND	
trans nonachlor	NA	NA	
oxychlordane	3.20	ND	
DDT's			
p,p'-DDT	23.00	2.48	
o,p'-DDT	NA	NA	
p,p'-DDE	23.00	17.39	
o,p'-DDE	<0.14	ND	
p,p'-DDD	NA	ND	
o,p'-DDD	NA	ND	
PCB'S			
Aroclor 1254	210.00	9.94	
PCC'S			
Toxaphene	NA	2.48	

CHLORINATED ORGANICS IN BENTHIC AMPHIPODS
ng/g lipid wt.
(n=5)

	Seakem 1988 (fresh sample) Mean	Std.Dev.	OceanChem 1989 (1988 extract) Mean	Std.Dev.	Fresh. Inst. 1989 (1988 extract) Mean	Std.Dev.
Hexachlorocyclohexanes						
alpha-HCH	168.00	40.69	>0.00 - 265.81		88.18	34.77
beta-HCH	4.48	3.89	ND		<4.27	
gamma-HCH	51.22	65.01	ND		7.82	2.37
Hexachlorobenzene	162.00	60.79	>0.00 - 188.25		114.24	42.48
Cyclodienes						
aldrin	>0.05 - 19.00		30.30	18.11	NA	
cis chlordane	440.00	292.78	ND		213.45	177.69
trans chlordane	105.40	56.36	>0.00 - 166.67		44.29	33.66
dieldrin	87.40	23.76	>0.00 - 32.95		62.63	18.63
endrin	10.98	9.56	ND		NA	
alpha-endosulfan	<0.90 - 1.20		ND		NA	
heptachlor	<0.14 - 3.70		>0.00 - 52.69		<1.51 - 2.59	
heptachlor epoxide	37.40	22.22	ND		16.81	11.31
methoxychlor	46.40	45.76	ND		NA	
mirex	70.00	27.92	ND		NA	
cis nonachlor	400.00	238.16	>0.00 - 83.33		182.90	136.57
trans nonachlor	NA		NA		617.05	300.83
oxychlordane	306.00	166.57	>0.00 - 46.88		161.76	67.51
DDT's						
p,p'-DDT	832.00	297.08	ND		197.88	91.30
o,p'-DDT	NA		NA		24.39	16.87
p,p'-DDE	1676.00	691.60	1301.43	1028.28	1237.97	578.77
o,p'-DDE	3.10 - 14.00		>0.00 - 848.00		NA	
p,p'-DDD	NA		>0.00 - 1500.85		124.91	46.71
o,p'-DDD	NA		ND		NA	
PCB'S						
Aroclor 1254	9240.00	3127.68	462.68	179.48	4684.00	2085.88
PCC'S						
Toxaphene	NA		44.64	20.29	1742.07	1141.01

Sample 3-87-38
Arctic Ice Isl. Benthic Amphipod - Imetonyx
Fresh wt.(g)= 3.57
Lipid (% of wet wt.)= 5.02
% Water= 75.92

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	150.00	ND	51.20
beta-HCH	0.80	ND	<1.99
gamma-HCH	12.00	ND	5.18
Hexachlorobenzene	120.00	ND	110.76
Cyclodienes			
aldrin	19.00	44.62	NA
cis chlordane	460.00	ND	136.85
trans chlordane	140.00	ND	33.07
dieldrin	130.00	ND	94.82
endrin	27.00	ND	NA
alpha-endosulfan	Q 3.60	ND	NA
heptachlor	3.70	ND	2.59
heptachlor epoxide	57.00	ND	36.45
methoxychlor	Q 1.70	ND	NA
mirex	110.00	ND	NA
cis nonachlor	480.00	ND	141.24
trans nonachlor	NA	NA	649.00
oxychlordane	580.00	ND	220.12
DDT's			
p,p'-DDT	860.00	ND	148.80
o,p'-DDT	NA	NA	13.35
p,p'-DDE	2600.00	3158.00	2214.14
o,p'-DDE	14.00	848.00	NA
p,p'-DDD	NA	ND	117.53
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	14000.00	792.00	8310.76
PCC'S			
Toxaphene	NA	44.62	1373.11

Sample 3-87-52
Arctic Ice Isl. Benthic Amphipod - Imetonyx
Fresh wt.(g)= 3.20
Lipid (% of wet wt.)= 6.64
% Water= 74.08

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	120.00	ND	61.90
beta-HCH	2.60	ND	<1.51
gamma-HCH	9.10	ND	7.23
Hexachlorobenzene	160.00	188.25	143.52
Cyclodienes			
aldrin	<0.05	18.83	NA
cis chlordane	280.00	ND	131.17
trans chlordane	70.00	ND	26.36
dieldrin	82.00	ND	53.01
endrin	<6.30	ND	NA
alpha-endosulfan	<0.90	ND	NA
heptachlor	<0.14	ND	<1.51
heptachlor epoxide	27.00	ND	15.21
methoxychlor	23.00	ND	NA
mirex	66.00	ND	NA
cis nonachlor	290.00	ND	125.75
trans nonachlor	NA	NA	519.73
oxychlordane	160.00	ND	96.54
DDT's			
p,p'-DDT	580.00	ND	143.37
o,p'-DDT	NA	NA	27.86
p,p'-DDE	1300.00	1139.00	1055.57
o,p'-DDE	5.80	404.82	NA
p,p'-DDD	NA	ND	87.50
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	7400.00	404.82	4966.11
PCC'S			
Toxaphene	NA	37.65	1440.21

Sample 1-V-8600103
Arctic Ice Isl. Benthic Amphipod - Anonyx nugax
Fresh wt.(g)= 2.05
Lipid (% of wet wt.)= 2.34
% Water= 80.09

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	140.00	83.33	73.50
beta-HCH	11.00	ND	<4.27
gamma-HCH	35.00	ND	9.83
Hexachlorobenzene	280.00	ND	178.21
Cyclodienes			
aldrin	<0.46	41.88	NA
cis chlordane	1000.00	ND	567.95
trans chlordane	200.00	166.67	110.68
dieldrin	93.00	ND	52.99
endrin	4.50	ND	NA
alpha-endosulfan	Q 1.50	ND	NA
heptachlor	<8.30	ND	<4.27
heptachlor epoxide	12.00	ND	2.99
methoxychlor	21.00	ND	NA
mirex	93.00	ND	NA
cis nonachlor	830.00	83.33	452.99
trans nonachlor	NA	NA	1179.91
oxychlordane	280.00	ND	139.32
DDT's			
p,p'-DDT	1200.00	ND	275.21
o,p'-DDT	NA	NA	55.13
p,p'-DDE	1800.00	958.97	1255.98
o,p'-DDE	Q 17.00	ND	NA
p,p'-DDD	NA	1500.85	215.81
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	11000.00	500.43	4556.84
PCC'S			
Toxaphene	NA	83.33	3961.54

Sample 2-V-1038
Arctic Ice Isl. Benthic Amphipod - Onisimus
Fresh wt.(g)= 2.75
Lipid (% of wet wt.)= 4.65
% Water= 70.19

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	230.00	265.81	107.96
beta-HCH	6.80	ND	<2.15
gamma-HCH	180.00	ND	5.59
Hexachlorobenzene	120.00	ND	65.16
Cyclodienes			
aldrin	Q 0.54	ND	NA
cis chlordane	250.00	ND	101.08
trans chlordane	52.00	31.18	18.06
dieldrin	70.00	ND	41.51
endrin	16.00	ND	NA
alpha-endosulfan	1.20	ND	NA
heptachlor	<2.90	ND	<2.15
heptachlor epoxide	70.00	ND	19.78
methoxychlor	130.00	ND	NA
mirex	43.00	ND	NA
cis nonachlor	190.00	15.70	79.35
trans nonachlor	NA	NA	341.51
oxychlordane	390.00	46.88	260.65
DDT's			
p,p'-DDT	420.00	ND	88.60
o,p'-DDT	NA	NA	6.67
p,p'-DDE	2100.00	1251.18	1255.70
o,p'-DDE	Q 6.10	ND	NA
p,p'-DDD	NA	ND	109.89
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	9000.00	312.90	3616.13
PCC'S			
Toxaphene	NA	31.18	687.53

Sample 2-J-1011
Arctic Ice Isl. Benthic Amphipod - Anonyx nugax
Fresh wt.(g)= 4.95
Lipid (% of wet wt.)= 6.13
% Water= 79.00

Compound (ng/g lipid wt.)	Seakem 1988	OceanChem 1989	Fresh. Inst. 1989
Hexachlorocyclohexanes			
alpha-HCH	200.00	ND	146.33
beta-HCH	1.20	ND	<1.63
gamma-HCH	20.00	ND	11.26
Hexachlorobenzene	130.00	ND	73.57
Cyclodienes			
aldrin	Q 0.22	46.17	NA
cis chlordane	210.00	ND	130.18
trans chlordane	65.00	ND	33.28
dieldrin	62.00	32.95	70.80
endrin	7.40	ND	NA
alpha-endosulfan	0.41	ND	NA
heptachlor	<1.30	52.69	<1.63
heptachlor epoxide	21.00	ND	9.62
methoxychlor	58.00	ND	NA
mirex	38.00	ND	NA
cis nonachlor	210.00	ND	115.17
trans nonachlor	NA	NA	395.11
oxychlordane	120.00	ND	92.17
DDT's			
p,p'-DDT	1100.00	ND	333.44
o,p'-DDT	NA	NA	18.92
p,p'-DDE	580.00	ND	408.48
o,p'-DDE	3.10	ND	NA
p,p'-DDD	NA	ND	93.80
o,p'-DDD	NA	ND	NA
PCB'S			
Aroclor 1254	4800.00	303.26	1970.15
PCC'S			
Toxaphene	NA	26.43	1247.96

APPENDIX D. CHLORINATED ORGANICS IN *EURYTHENES* WHOLE TISSUE

Data Summary - Means and Standard Deviation (ng/g wet weight) 58
D(1-2) - Raw Data (ng/g wet weight) 59
D3 - Means and Standard Deviation (ng/g lipid weight) 62
D(4-5) - Raw Data (ng/g lipid weight) 63

Key: OceanChem = OceanChem Group (Dartmouth, N.S.)
Fresh. Inst. = Freshwater Institute (DFO Central and Arctic Region, Winnipeg, Man.)

CHLORINATED ORGANICS IN BENTHIC AMPHIPODS
ng/g wet wt.

	OceanChem 1989 (fresh sample) Mean (n=8)	Std.Dev.	Fresh. Inst. 1989 (fresh sample) Mean (n=2)	Std.Dev.
Hexachlorocyclohexanes				
alpha-HCH	ND		0.76	0.37
beta-HCH	>0.00 - 89.00		<0.10	0.00
gamma-HCH	>0.00 - 20.00		0.17	0.02
Hexachlorobenzene	>0.00 - 37.00		6.84	1.28
Cyclodienes				
aldrin	ND		NA	
cis chlordane	160.38	84.94	74.39	19.96
trans chlordane	68.13	38.32	24.81	10.99
dieldrin	>0.00 - 18.00		7.04	3.88
endrin	>0.00 - 10.00		NA	
alpha-endosulfan	>0.00 - 11.00		NA	
heptachlor	ND		<0.10	0.00
heptachlor epoxide	ND		<0.10 - 1.40	
methoxychlor	>0.00 - 1348.00		NA	
mirex	ND		NA	
cis nonachlor	144.18	81.56	30.71	5.59
trans nonachlor	NA		212.17	20.34
oxychlordane	84.25	96.64	43.22	21.59
DDT's				
p,p'-DDT	>0.00 - 2604.00		747.45	77.63
o,p'-DDT	NA		102.74	85.58
p,p'-DDE	>0.00 - 2107.00		850.80	252.20
o,p'-DDE	>0.00 - 337.00		NA	
p,p'-DDD	>0.00 - 1490.00		240.77	6.73
o,p'-DDD	>0.00 - 465.00		NA	
PCB'S				
Aroclor 1254	3354.75	1607.24	2509.35	655.25
PCC'S				
Toxaphene	2634.25	697.09	986.94	245.80

Laboratory: OceanChem

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #1	Amphipod #2	Amphipod #3	Amphipod #4	Amphipod #5
Fresh wt. (g)=	4.31	3.37	1.85	2.52	2.41
Lipid (% of wet wt.)=	19.45	14.34	8.35	14.41	21.01
% Water=	59.09	55.98	65.07	65.44	57.22
Compound (ng/g wet wt.)					
Hexachlorocyclohexanes					
alpha-HCH	ND	ND	ND	ND	ND
beta-HCH	ND	ND	ND	ND	89.00
gamma-HCH	20.00	ND	ND	ND	ND
Hexachlorobenzene	33.00	37.00	ND	ND	37.00
Cyclodienes					
aldrin	ND	ND	ND	ND	ND
cis chlordane	77.00	151.00	126.00	63.00	334.00
trans chlordane	33.00	37.00	52.00	29.00	140.00
dieldrin	ND	ND	18.00	ND	ND
endrin	5.00	ND	10.00	ND	ND
alpha-endosulfan	4.00	ND	ND	ND	ND
heptachlor	ND	ND	ND	ND	ND
heptachlor epoxide	ND	ND	ND	ND	ND
methoxychlor	1348.00	ND	ND	ND	ND
mirex	ND	ND	ND	ND	ND
cis nonachlor	68.00	124.00	123.00	84.00	339.00
trans nonachlor	NA	NA	NA	NA	NA
oxychlordane	25.00	328.00	70.00	39.00	78.00
DDT's					
p,p'-DDT	785.00	1274.00	1211.00	646.00	2604.00
o,p'-DDT	NA	NA	NA	NA	NA
p,p'-DDE	360.00	2107.00	639.00	ND	1308.00
o,p'-DDE	ND	337.00	ND	19.00	89.00
p,p'-DDD	ND	561.00	392.00	323.00	1490.00
o,p'-DDD	89.00	ND	465.00	89.00	447.00
PCB'S					
Aroclor 1254	1820.00	6644.00	2829.00	2443.00	5039.00
PCC'S					
Toxaphene	1764.00	3025.00	2923.00	3083.00	3884.00

(.../Continued on p. 60)

(Continued from p. 59/...)

Laboratory: OceanChem

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #6	Amphipod #7	Amphipod #8		
Fresh wt. (g)=	3.18	3.61	6.18		
Lipid (% of wet wt.)=	14.67	17.58	16.21		
% Water=	68.01	59.47	58.23		
Compound (ng/g wet wt.)				Mean	Std.Dev.
Hexachlorocyclohexanes					
alpha-HCH	ND	ND	ND	ND	
beta-HCH	ND	ND	ND	>0.00 - 89.00	
gamma-HCH	ND	ND	ND	>0.00 - 20.00	
Hexachlorobenzene	ND	29.00	ND	>0.00 - 37.00	
Cyclodienes					
aldrin	ND	ND	ND	ND	
cis chlordane	100.00	212.00	220.00	160.38	84.94
trans chlordane	53.00	89.00	112.00	68.13	38.32
dieldrin	4.00	ND	ND	>0.00 - 18.00	
endrin	ND	ND	ND	>0.00 - 10.00	
alpha-endosulfan	7.00	ND	11.00	>0.00 - 11.00	
heptachlor	ND	ND	ND	ND	
heptachlor epoxide	ND	ND	ND	ND	
methoxychlor	ND	ND	ND	>0.00 - 1348.00	
mirex	ND	ND	ND	ND	
cis nonachlor	84.00	178.00	159.00	144.18	81.56
trans nonachlor	NA	NA	NA	NA	
oxychlordane	ND	37.00	97.00	84.25	96.64
DDT's					
p,p'-DDT	ND	1160.00	ND	>0.00 - 2604.00	
o,p'-DDT	NA	NA	NA	NA	
p,p'-DDE	378.00	686.00	ND	>0.00 - 2107.00	
o,p'-DDE	ND	ND	ND	>0.00 - 337.00	
p,p'-DDD	258.00	ND	762.00	>0.00 - 1490.00	
o,p'-DDD	125.00	ND	256.00	>0.00 - 465.00	
PCB'S					
Aroclor 1254	1584.00	2801.00	3678.00	3354.75	1607.24
PCC'S					
Toxaphene	1725.00	2585.00	2085.00	2634.25	697.09

Laboratory: Freshwater Institute

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #9	Amphipod #10		
Fresh wt. (g)=	5.30	5.35		
Lipid (% of wet wt.)=	9.29	9.29		
% Water=	68.82	68.82		
Compound (ng/g wet wt.)				
Hexachlorocyclohexanes			Mean	Std.Dev.
alpha-HCH	1.13	0.39	0.76	0.37
beta-HCH	<0.10	<0.10	<0.10	0.00
gamma-HCH	0.19	0.15	0.17	0.02
Hexachlorobenzene	8.12	5.56	6.84	1.28
Cyclodienes				
aldrin	NA	NA	NA	
cis chlordane	94.35	54.42	74.39	19.96
trans chlordane	35.79	13.82	24.81	10.99
dieldrin	10.91	3.16	7.04	3.87
endrin	NA	NA	NA	
alpha-endosulfan	NA	NA	NA	
heptachlor	<0.10	<0.10	<0.10	0.00
heptachlor epoxide	1.40	<0.10	<0.10 - 1.40	
methoxychlor	NA	NA	NA	
mirex	NA	NA	NA	
cis nonachlor	25.12	36.30	30.71	5.59
trans nonachlor	191.82	232.51	212.17	20.34
oxychlordane	21.63	64.80	43.21	21.59
DDT's				
p,p'-DDT	669.82	825.08	747.45	77.63
o,p'-DDT	188.32	17.16	102.74	85.58
p,p'-DDE	598.60	1103.00	850.80	252.20
o,p'-DDE	NA	NA	NA	
p,p'-DDD	234.04	247.50	240.77	6.73
o,p'-DDD	NA	NA	NA	
PCB'S				
Aroclor 1254	1854.10	3164.60	2509.35	655.25
PCC'S				
Toxaphene	1232.74	741.13	986.94	245.80

CHLORINATED ORGANICS IN BENTHIC AMPHIPODS
ng/g lipid wt.

	OceanChem 1989 (fresh sample) Mean n=8	Std.Dev.	Fresh. Inst. 1989 (fresh sample) Mean n=2	Std.Dev.
Hexachlorocyclohexanes				
alpha-HCH	ND		8.18	3.98
beta-HCH	>0.00 - 424.00		<1.08	0.00
gamma-HCH	>0.00 - 103.00		1.83	0.22
Hexachlorobenzene	>0.00 - 258.00		73.63	13.78
Cyclodienes				
aldrin	ND		NA	
cis chlordane	1028.75	441.05	800.70	214.91
trans chlordane	434.50	200.33	267.01	118.25
dieldrin	>0.00 - 216.00		75.73	41.71
endrin	>0.00 - 120.00		NA	
alpha-endosulfan	>0.00 - 68.00		NA	
heptachlor	ND		<1.08	0.00
heptachlor epoxide	ND		7.54	7.54
methoxychlor	>0.00 - 6931.00		NA	
mirex	ND		NA	
cis nonachlor	931.50	412.41	330.57	60.17
trans nonachlor	NA		2283.80	219.00
oxychlordane	588.00	688.85	465.18	232.35
DDT's				
p,p'-DDT	>0.00 - 14503.00		8045.75	835.63
o,p'-DDT	NA		1105.92	921.21
p,p'-DDE	>0.00 - 14693.00		9158.24	2714.74
o,p'-DDE	>0.00 - 2350.00		NA	
p,p'-DDD	>0.00 - 7092.00		2591.72	72.44
o,p'-DDD	>0.00 - 5569.00		NA	
PCB'S				
Aroclor 1254	22491.00	11636.50	27011.31	7053.29
PCC'S				
Toxaphene	15788.25	8958.64	10623.63	2645.91

Laboratory: OceanChem

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #1	Amphipod #2	Amphipod #3	Amphipod #4	Amphipod #5
Fresh wt. (g)=	4.31	3.37	1.85	2.52	2.41
Lipid (% of wet wt.)=	19.45	14.34	8.35	14.41	21.01
% Water=	59.09	55.98	65.07	65.44	57.22
Compound (ng/g lipid wt.)					
Hexachlorocyclohexanes					
alpha-HCH	ND	ND	ND	ND	ND
beta-HCH	ND	ND	ND	ND	424.00
gamma-HCH	103.00	ND	ND	ND	ND
Hexachlorobenzene	170.00	258.00	ND	ND	176.00
Cyclodienes					
aldrin	ND	ND	ND	ND	ND
cis chlordane	396.00	1053.00	1509.00	437.00	1590.00
trans chlordane	170.00	258.00	623.00	201.00	666.00
dieldrin	ND	ND	216.00	ND	ND
endrin	26.00	ND	120.00	ND	ND
alpha-endosulfan	21.00	ND	ND	ND	ND
heptachlor	ND	ND	ND	ND	ND
heptachlor epoxide	ND	ND	ND	ND	ND
methoxychlor	6931.00	ND	ND	ND	ND
mirex	ND	ND	ND	ND	ND
cis nonachlor	350.00	865.00	1473.00	583.00	1614.00
trans nonachlor	NA	NA	NA	NA	NA
oxychlordane	129.00	2287.00	838.00	271.00	371.00
DDT's					
p,p'-DDT	4036.00	8884.00	14503.00	4483.00	12394.00
o,p'-DDT	NA	NA	NA	NA	NA
p,p'-DDE	1851.00	14693.00	7653.00	ND	6226.00
o,p'-DDE	ND	2350.00	ND	132.00	424.00
p,p'-DDD	ND	3912.00	4695.00	2242.00	7092.00
o,p'-DDD	458.00	ND	5569.00	618.00	2128.00
PCB'S					
Aroclor 1254	9357.00	46332.00	33880.00	16954.00	23984.00
PCC'S					
Toxaphene	9069.00	3025.00	35006.00	21395.00	18486.00

(.../Continued on p. 64)

(Continued from p. 63/...)

Laboratory:OceanChem

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #6	Amphipod #7	Amphipod #8		
Fresh wt. (g)=	3.18	3.61	6.18		
Lipid (% of wet wt.)=	14.67	17.58	16.21		
% Water=	68.01	59.47	58.23		
Compound (ng/g lipid wt.)				**Mean**	**Std.Dev.**
Hexachlorocyclohexanes					
alpha-HCH	ND	ND	ND	ND	
beta-HCH	ND	ND	ND	>0.00 - 424.00	
gamma-HCH	ND	ND	ND	>0.00 - 103.00	
Hexachlorobenzene	ND	165.00	ND	>0.00 - 258.00	
Cyclodienes					
aldrin	ND	ND	ND	ND	
cis chlordane	682.00	1206.00	1357.00	1028.75	441.05
trans chlordane	361.00	506.00	691.00	434.50	200.33
dieldrin	27.00	ND	ND	>0.00 - 216.00	
endrin	ND	ND	ND	>0.00 - 120.00	
alpha-endosulfan	48.00	ND	68.00	>0.00 - 68.00	
heptachlor	ND	ND	ND	ND	
heptachlor epoxide	ND	ND	ND	ND	
methoxychlor	ND	ND	ND	>0.00 - 6931.00	
mirex	ND	ND	ND	ND	
cis nonachlor	573.00	1013.00	981.00	931.50	412.41
trans nonachlor	NA	NA	NA	NA	
oxychlordane	ND	210.00	598.00	588.00	688.85
DDT's					
p,p'-DDT	ND	6598.00	ND	>0.00 - 14503.00	
o,p'-DDT	NA	NA	NA	NA	
p,p'-DDE	2577.00	3902.00	ND	>0.00 - 14693.00	
o,p'-DDE	ND	ND	ND	>0.00 - 2350.00	
p,p'-DDD	1759.00	ND	4701.00	>0.00 - 7092.00	
o,p'-DDD	852.00	ND	1579.00	>0.00 - 5569.00	
PCB'S					
Aroclor 1254	10798.00	15933.00	22690.00	22491.00	11636.50
PCC'S					
Toxaphene	11759.00	14704.00	12862.00	15788.25	8958.64

Laboratory: Muir-Freshwater Institute

Sample: Eurythenes from CESAR, 7/4/83

Sample Description:	Amphipod #9	Amphipod #10		
Fresh wt. (g)=	5.30	5.35		
Lipid (% of wet wt.)=	9.29	9.29		
% Water=	68.82	68.82		
Compound (ng/g lipid wt.)				
Hexachlorocyclohexanes			Mean	Std.Dev.
alpha-HCH	12.16	4.20	8.18	3.98
beta-HCH	<1.08	<1.08	<1.08	0.00
gamma-HCH	2.05	1.61	1.83	0.22
Hexachlorobenzene	87.41	59.85	73.63	13.78
Cyclodienes				
aldrin	NA	NA	NA	
cis chlordane	1015.61	585.79	800.70	214.91
trans chlordane	385.25	148.76	267.01	118.25
dieldrin	117.44	34.02	75.73	41.71
endrin	NA	NA	NA	
alpha-endosulfan	NA	NA	NA	
heptachlor	<1.08	<1.08	<1.08	0.00
heptachlor epoxide	15.07	<1.08	7.54	7.54
methoxychlor	NA	NA	NA	
mirex	NA	NA	NA	
cis nonachlor	270.40	390.74	330.57	60.17
trans nonachlor	2064.80	2502.80	2283.80	219.00
oxychlordane	232.83	697.52	465.18	232.34
DDT's				
p,p'-DDT	7210.12	8881.38	8045.75	835.63
o,p'-DDT	2027.13	184.71	1105.92	921.21
p,p'-DDE	6443.49	11872.98	9158.24	2714.74
o,p'-DDE	NA	NA	NA	
p,p'-DDD	2519.27	2664.16	2591.72	72.44
o,p'-DDD	NA	NA	NA	
PCB'S				
Aroclor 1254	19958.02	34064.59	27011.31	7053.28
PCC'S				
Toxaphene	13269.54	7977.72	10623.63	2645.91